FOURTH ANNUAL REPORT OF THE STATE FORESTER OF MASSACHUSETTS FOR THE YEAR 1907

FRANK WM. RANE
STATE FORESTER

APPROVED BY THE STATE BOARD OF PUBLICATION

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Commonwealth of Massachusetts.

FOURTH ANNUAL REPORT OF THE STATE FORESTER.

To the General Court.

It is with a degree of pleasure that I offer this my first annual report, although the fourth since the establishment of the office of State Forester.

The efficiency of the office during the past year has been greatly increased in every direction. All of the lines of work previously begun by my predecessor have been carried forward, and many new features added. The work of making examinations and giving advice on forestry matters has been constantly growing, until at present the head of the department finds it almost impossible to meet the demands with his present force of assistants. The correspondence alone, we are told by the post-office authorities, has increased fully two hundred per cent during the year.

The hearty co-operation asked for upon my accepting the position of State Forester has been more than realized in the very hearty and cordial assistance rendered on every hand.

After a careful study of our forestry conditions, and definitely deciding upon what legislation was needed most, we were fortunate in being able to present some bills before the last General Court, even after the usual time had expired, due to the recommendations in Governor Guild's inaugural. These bills met with approval and were enacted.

At the forestry hearing before the committee on agriculture practically every organization in the State interested in forestry

was present. It would be impossible to have had a more representative hearing.

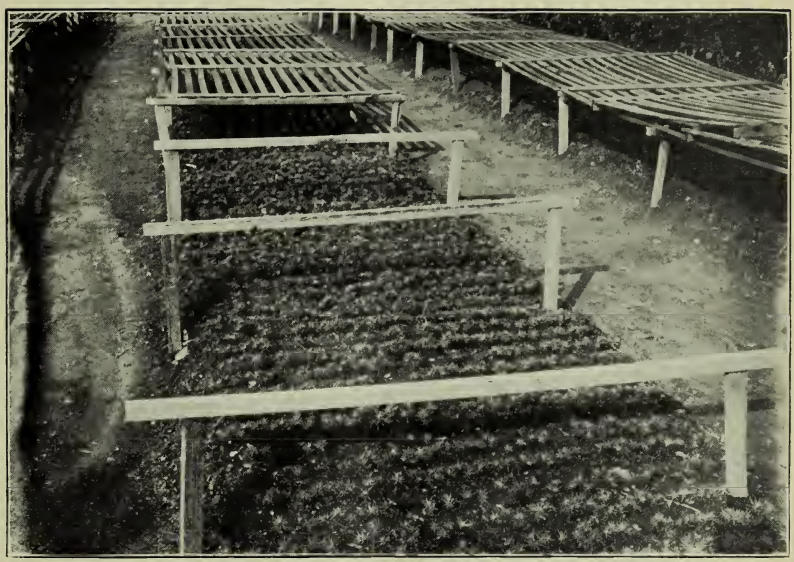
The following organizations passed definite resolutions favoring the bills which afterwards were enacted: the Massachusetts State Grange, at their annual meeting at Faneuil Hall, in Boston; the Massachusetts State Board of Agriculture, at their annual winter meeting; the Eastern Shook and Wooden Box Manufacturers Association, at their annual meeting at Young's Hotel, Boston. The executive committee of the Massachusetts Forestry Association assisted in many ways, and to Mr. Henry James, Jr., the chairman, I desire to give the credit of shaping these bills in their present excellent form. The presidents of the railroads traversing our State also gave their personal support toward better forest fire regulations and laws.

Forest Laws Publication.

Upon the passage of the new forest laws the State Forester compiled the various enactments of the State forest laws, and had the same printed in a small booklet, 10,000 copies of which have been distributed quite generally throughout the State. This booklet is of convenient size for carrying in one's pocket, and also can be sent in an ordinary letter envelope, and hence is admirably adapted for dissemination and use. The double index system of reference is carried out in the publication, the paragraphs being indicated by heavier type side headings.

Forest Fire Posters.

Following the instructions in the statutes, the State Forester had the abbreviated instruction of the forest fire laws printed on a large poster, 18 by 27 inches in size, and distributed generally throughout the Commonwealth. Paper posters were printed for use indoors, while similar cloth posters were distributed for out-of-door use. The main heading, "Forest Fire Laws," was printed in large letters of bright red, while the remainder was printed in green ink. In compliance with the law, the railroads have placed a poster in each of their depots, and similar notices are to be found in the various post-offices of the State. The others have been posted by the town authorities.



THE STATE NURSERY AT AMHERST.
White pine seedlings at the end of the first season.

The Forest Warden Law.

Beginning with the coming spring elections in the towns, in accordance with the legislation of 1907, the new board of selectmen is empowered to appoint a forest warden, who shall be given authority to look after the forest interests of the town.

The particular channel of usefulness whereby the recent enactments of the Legislature have made it possible for the State Forester to accomplish results is through this town forest warden system.

The appointment of the town forest warden is subject to the approval of the State Forester. His compensation is met by the individual towns, and he has the power of appointing his deputies.

The forest warden may also be called upon by the State Forester for whatever information is desired from time to time: as the correcting of his town forest acreage; amount of reforestation done during the year; number and kinds of forest fires; depredations from insect and fungous disease outbreaks, etc. For this work the warden is compensated by the State Treasurer through bills presented to and approved by the State Forester. For this work he is paid at the rate of not to exceed 35 cents an hour.

The State Forester has the privilege of calling and making arrangements for conventions of forest wardens, and paying wholly or in part their travelling expenses, the only provision being that no money shall be expended in paying the travelling expenses of any one warden to or from more than one convention in any one year; that the total expense of said convention shall not exceed $2,000, and be held within the Commonwealth. This enactment ought to furnish to a certain extent the brief schooling each year in practical forestry to the men who most need it for accomplishing economic results in the State. The law also, it will be seen, allows the State Forester the privilege of retaining valuable wardens in the various towns when they have proven their merit.

Through this law we now have a thoroughly systematized plan of usefulness, a natural channel through which it is believed much good to our forest interests must result. When we once

get a thoroughly organized corps of competent forest wardens, one in each of our three hundred and twenty towns, who can intelligently handle forest fires and other forestry matters of vital concern, we shall have made great progress, both from the economic and æsthetic standpoints. The small booklet, "Brief Instructions to Massachusetts Forest Wardens," discusses quite fully the duties of the forest warden. This is obtainable at the State Forester's office.

Spark Arresters on Railroad Engines.

In compliance with the law passed at the last session of the Legislature, the Railroad Commission had a conference with the various railroads of the State, and after going over the matter of establishing what was thought to be an efficient spark arrester for every engine on each road operating in the State, the commission sent out the following orders to the railroad authorities. (The following being an example of that sent to one road): —

Petition of the New York Central and Hudson River Railroad Company, Lessee of the Boston & Albany Railroad, for Approval of Installation and Maintenance of a Spark Arrester.

After consideration, it is —

Ordered, That the approval of the Board, under the provisions of chapter 431 of the Acts of 1907, be hereby given to the installation and maintenance on engines of the Boston & Albany railroad of spark arresters of the type submitted with the petition, and shown upon plan filed therewith, entitled "New York central lines; smoke box; interior arrangement; locomotive," and dated Oct. 16, 1906.

Attest: (Signed) Charles E. Mann,
Clerk.

The only thing yet to be established is that some definite methods of efficient inspection be arranged, and it is believed this is a matter that the railroads will regulate satisfactorily.

Public Lectures and Addresses.

The calls for lectures on forestry by the State Forester have been many. It has been made a policy to accept invitations to address public meetings whenever it can be shown that good results are likely to follow. In accepting invitations, the request is made that an audience of at least one hundred be guaranteed,

if possible. This request has invariably resulted in more activity on the part of the local organizations in getting out large numbers, and in more efficient and far-reaching service on the part of the State Forester. An example of this might be cited. In asking for an address on forestry by an organization whose membership was thirty-six, the acceptance was on the condition that the meeting be made public, and under the usual requirements, resulting in an audience of over five hundred. The number of lectures delivered during the year was forty-five.

Lectures at the Agricultural College.

In accordance with arrangements made with the authorities representing the trustees of the college, a course of instructions on forestry, consisting of ten lectures and exercises, was given by the State Forester to the students of the college last spring. I am frank to say that it would be impossible to work with a more satisfactory and intelligent body of students than attended this course of lectures.

A talk on forestry was also given by the State Forester before the Conference on Rural Progress, called by President Kenyon L. Butterfield in October at the Agricultural College.

The National Irrigation and Forestry Congress.

The State Forester was invited to address the above congress at Sacramento, Cal., September 2 to 7, on "State Forestry Development," and present a paper upon "The Use of Artificial Fertilizers in Forestry." This trip was also made use of in visiting some large commercial nurseries in the middle west, as well as studying general forestry methods on the Pacific coast. The congress proved a great success, and was teeming with enthusiasm and interest, peculiar to western hustle. Similar meetings in the east would be productive of great good. Massachusetts was the only New England State that was represented by a delegate, and even New York and Pennsylvania were not represented. There are many features about our New England environment and conditions that are of great advantage in forestry. One thing particularly, — we do not have the dry season to overcome; and in reforestation this one thing is greatly in our favor, to say nothing about better markets, etc. An easterner

does well to study the comparative conditions of the east and west. If we were to keep much of our capital at home, and employ it equally as lavishly toward modern forestry or even agriculture, I believe as good or even better results could be assured.

Other Lectures Outside the State.

The State Forester has been called upon to address various other organizations of a national or State nature outside this State, and was able to give addresses on forestry before the following: the Society for the Promotion of Agricultural Science, held at Lansing, Mich., May 29; the National Horticultural Congress, held at Jamestown Exposition, September 23; and the New Hampshire State Board of Agriculture's annual winter meeting, at Whitfield, December 5. The meeting of the American Association for the Advancement of Science, which convened in New York the first of the year, was also attended.

Publications.

The publications of the office for the year are as follows: —

	Pages.	Copies.
"The Commonwealth of Massachusetts Forest Laws," . .	50	10,000
"Brief Instructions to Massachusetts Forest Wardens," .	12	5,000
"How and when to collect White Pine Seed," . . .	16	10,000
"Forestry from the Commercial Standpoint," . . .	16	5,000
"The Commercial Forest Trees in Massachusetts, how you may know them" (in press).	68	5,000
"Forestry in the Primary Schools" (in press), . . .	50	5,000
"Forest Laws concerning Railroads,"	8	5,000
Total, ...	220	45,000

The Forest Nursery at Amherst.

Last spring the nursery work was reorganized and placed in the hands of R. S. Langdell of Lowell, a former student of the writer, who has greatly improved the nursery, although it has been carried on under very limited conditions. Instead of having the land allotted by the college in different places, as heretofore, it has been concentrated, and therefore more easily handled. A small, inexpensive tool and packing shed has been erected,

THE STATE NURSERY AT AMHERST.
Beds of white ash, ready for distribution.

where necessary implements for nursery work are housed and seedlings packed for shipment.

(*a*) *General Forest Seedlings distributed.*

In order to awaken interest and distribute seedlings throughout the State, notices were sent to all newspapers of the State, asking them to print the following offer from the State Forester: —

Seedling Forest Trees Available. — F. W. Rane, State Forester, State House, Boston, gives notice that he can distribute, to a limited number of those who apply, 150 white pine and 150 white ash, two-year-old trees, suitable for setting out for forest purposes. Send $1 with order. Express charges will be advanced. No orders received after April 30. One order only per person, as the object is to disseminate them quite generally. Should the supply become exhausted, the money will be returned.

Set the plants where they are to grow, 6 by 6 feet apart, as soon as they are received. Do not allow the roots to get dry.

It is hoped that this one-fourth-acre planting will create an interest in doing more planting later. It is understood that these seedlings are to be planted in Massachusetts.

In response to this offer, one hundred and twenty and one-half orders were sent out, as indicated in the following table: —

Name.	Address.	Name.	Address.
Azro A. Coburn,	Holyoke.	Lewis Damon,	Ashby.
Arthur M. Robinson,	Pittsfield.	James L. Miller,	West Lynn.
W. W. Willard,	Springfield.	W. L. Harris,	Deerfield.
James H. Newton,	Holyoke.	Horace T. Fogg,	Norwell.
Robert M. Woods,	– –	John W. Waters,	Fitchburg.
Mrs. Wm. L. Paddock,	Dalton.	Arthur P. Rugg,	Sterling.
J. S. Hubbard,	Fiskdale.	P. W. McCellan,*	Haverhill.
W. L. White,	Phillipston.	Eben S. Fuller,	Clinton.
Pontoosuc Woolen Manufacturing Company,	Pittsfield.	J. W. Van Huyck,	Lee.
		A. J. Wellington,	Ashburnham.
James Griffin,	South Hadley.	E. F. Powers,	Leominster.
Charles W. Power,	Pittsfield.	Lester R. Maynard,	South Berlin.
Geo. H. Goodbeer,	Fitchburg.	L. B. Ramsdell,	Gardner.
Wm. B. Kimball,	Enfield.	W. A. Munson,	Huntington.
John H. Holder,	Hudson.	Claude J. Mathieu,	West Boylston
H. G. Zilliacus,	Fitchburg.	Joseph Smith,	Unionville.
Roy L. Eaton,	Salisbury.	David H. Tillson,	Amherst.
Silas W. Hutchinson,	Fitchburg.	Edward F. White,*	Holyoke.
Waldo C. York,	Marstons Mills.	Charles L. Johnson,	Southborough.
Thomas C. Esty,	Amherst.	R. L. Bowman,	Middleborough.
C. H. Waymouth,	Fitchburg.	J. M. Perkins,	Hudson.
Albert F. White,	East Freetown.	Henry F. Whitney,	Lowell.
Miss Helen Holmes,	Kingston.	Myron A. Richardson,	West Brookfield.
Willis F. Austin,	Amesbury.	Edwin Warren,	Spencer.
W. F. Whitney,	South Ashburnham.	Thaxter Scott & Son,	Hawley.
		Geo. E. Cogswell,	Cushman.
		J. F. Rice,	Barre.
Warren F. Bemis,	Hubbardston.	Walter F. Partridge,	West Upton.
Priest Bros.,	Littleton.	J. Henry Gleason,	Marlborough.

* Two orders.

Name.	Address.	Name.	Address.
Chas. M. Phelps,	Blandford.	Walter White,	Templeton.
Marcus M. Multer,	Marlborough.	C. R. Stewart,	Templeton.
Thos. H. Skinner,	Princeton.	Wm. B. Hale,	Templeton.
E. H. Alderman,	Chester.	Seth P. N. Hall,	Williamsville.
Mrs. Adolph Miller,	West Springfield.	A. B. Terry,	Williamsville.
Mrs. Mary A. Butterick,	Sterling.	A. S. Lodge,	Williamsville.
G. L. Twitchell,	Brookfield.	L. E. Parminter,	Williamsville.
C. L. Fairbanks,	Southborough.	L. W. Buffington,	Williamsville.
E. W. Howe,	Concord.	L. W. Morgan,	Williamsville.
Chas. F. Allen,	Rowley.	B. F. Collins,	Williamsville.
Frank Sprague,	Still River.	L. M. Thomas,	Templeton.
P. C. Bronson,	Ashfield.	Benjamin D. Hyde,	North Amherst.
F. H. Holden,	Plainfield.	W. A. Graves,	Greenfield.
D. S. Freeman,	Millington.	R. R. Ranney,	Ashfield.
John H. Daniels,	Fitchburg.	W. H. Carter,	Andover.
C. H. Ball,	East Windsor.	Miss Sarah Fuller,	Newton Lower Falls.
R. F. Walsh,	Easthampton.		
Wm. Haskett,	South Athol.	Ella C. Jordan,	Newton Lower Falls.
F. W. Whitney,	South Athol.		
O. E. Bradway,	Monson.	Geo. B. Haskell,	Rochester.
Julia F. Darling,	Milford.	Charles A. Stone,*	Plymouth.
Wm. Hale,	Newburyport.	Fred A. Hannaford,	South Lancaster.
H. J. Franklin,	Wareham.	L. Cora Brown,	Concord.
Henry M. Allen,	Chilmark.	Thomas R. B. Dole,	Ayer.
Lot Phillips & Co.,*	West Hanover.	A. M. Bridgman,	State House, Boston.
J. W. Howes,	South Fall.		
E. C. Wright,	Campello.	Arthur H. Wellman,	Topsfield.
C. E. Norton,	Cambridge.	A. P. White,	Salem.
J. A. Monahan,	Fiskdale.	C. H. Copeland,	Scituate.
C. H. Johnson,	Easthampton.	Geo. W. Burroughs,	Acton.
Edwin A. Start,	Billerica.	L. L. Lewis,	Ashland.
F. H. Foster,	Andover.	F. W. Peters,	Bolton.
H. Gertrude Hale,	Templeton.		

* Two orders.

(*b*) *Distribution of Forest Tree Seeds and Seedlings to Schools.*

Thinking our public schools might be interested in having some seeds and seedlings for educational purposes, the following letter was addressed to each superintendent in the State: —

To School Superintendents.

In connection with the State forest service we have a forest nursery, and it has occurred to me that there are schools that would derive a great deal of knowledge and economic benefit from having a small collection of forest tree seedlings growing in the school grounds or in the school gardens where they are already established.

Forestry is a subject worthy of promotion, and the simple A B C of forestry can well be begun with our school children. Trees have much of interest in them at any time of the year, and hence can be studied at any season. There is wide interest at present in school gardening; if to it we add some forest nursery work, making it a year-round affair and a perennial rather than for a short season each year, I am sure it will be a happy improvement.

Make it a plan to have the children collect tree seeds when they are ripe; then plant and care for the seedlings, ultimately transplanting them upon our many thousand acres of waste land in all sections of our Commonwealth. Some seeds, like the acorn and chestnut, may be planted directly where they are to grow.

In order to assist any schools in a beginning, I am going to offer to a limited extent, in so far as our seedlings hold out, and we can spare the time to do the work, — first come, first served, — a collection of seedlings and seed as follows: —

12 white pine seedlings, two years old.
24 white ash seedlings, two years old.
12 red spruce seedlings, two years old.
5 beech seedlings.

½ ounce of white pine seed (900 seed).
12 chestnut seed.
25 acorn seed.
50 white ash seed.

Bulletin No. 4 of this office, giving instructions for handling and care of the nursery, will be sent with each order.

The only expense to the school requesting this list will be the estimated actual expense in digging, packing, etc., $1 for each collection. The express charges will be advanced. Only one collection is offered a school. The $1 should accompany the order. Should we be unable to send the collection, the money will be returned. No orders should be sent in to reach the office later than May 1.

It is hoped that in this small beginning we may foster in the young, our coming generation, not only a fundamental economic recognition of forestry, but return to Massachusetts and New England the natural beauty we all so much would love to see.

Yours very sincerely, F. W. Rane,
State House, Boston, Mass.

In response to this offer forty-seven orders were received, and sent out as indicated in the following table: —

Name.	Address.	Name.	Address.
C. H. Morse,	Medford.	Frank A. Andrews,	Greendale school, Worcester.
Mary L. Lincoln,	Lancaster.		
H. E. Richardson,	Greenfield.	Mary L. Potter,	Lawrence.
Amelia R. Amos,	North Attleborough.	Florence Marshall,	Tolland.
		John I. Rackcliffe,	Campello.
A. L. Hardy,	Amherst (2 orders).	Edward Warren,	Spencer.
J. W. Waters,	Fitchburg.	Benj. D. May,	Nantucket.
Prof. C. M. Weed,	Lowell.	Jessie P. Leary,	Salem.
John G. Thompson,	Fitchburg.	Jennie C. Foskett,	Charlton.
W. S. Bagg,	Springfield.	Wm. H. Martin,	Comins school, Roxbury Crossing, Boston.
S. D. Brooks,	Brighton.		
C. S. Lyman,	Hudson.		
Monatiquot school,	Braintree.	Lincoln Owen,	Rice school, Boston.
Penniman school,	Braintree.	M. S. Donaldson,	Brockton.
Noah Torrey school,	South Braintree.	M. L. Brown,	Rhode Island Normal School, Providence, R. I.
W. L. Coggins,	Rockland (8 orders).		
W. E. Gushee,	Ludlow (3 orders).		
E. F. P. Perrin,	Grammar school, West Barnstable.	F. A. Morse,	R. G. Shaw school, Boston.
L. M. Moody,	High school, Hyannis.	Helen F. Batchelder,	Bridgewater.
		E. H. Russell,	State Normal School, Worcester.
S. W. Ferguson,	Osterville.		
Miss R. O. Kendall,	Pittsfield.	Nellie L. Bailey,	School Street school, Haverhill.
Miss Adah L. Harvey,	Northfield grammar school.		

Fifteen thousand two-year-old white pine seedlings were purchased from the New York State Forester and several thousand

from other sources, which were used in filling the above orders.

Each person for whom a forest working plan or assistance in forestry has been given, in so far as there were records in the office, was consulted, that he might be assisted in procuring seedlings at reasonable rates. The office charged in each instance simply enough to cover the expense of first cost to the State. Where many small lots, as to schools and farmers, were sent, the expense of packing for shipment has been proportionally higher than were we shipping in larger quantities.

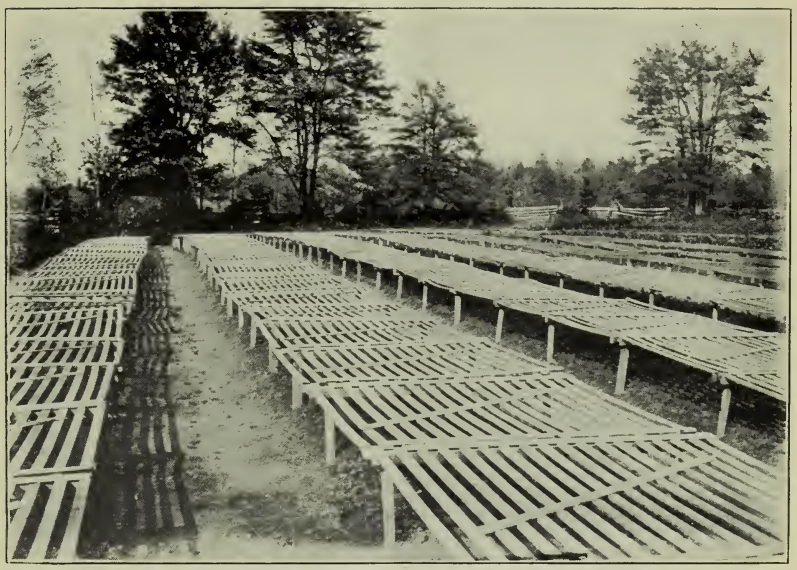
(c) *Other Seedlings distributed.*

Besides the above, the following seedlings were also distributed from the nursery: —

C. F. King, Taunton, 5,000 white ash,	$15 00
Mr. Paine, State House, 250 beech, 500 white ash,	2 25
Mr. Paine, State House, 1 pound white pine seed,	4 00
F. A. Smith, Taunton, 1,000 white ash,	3 00
Theodore F. Borst, South Framingham, 6,000 white ash,	18 00
W. G. Nickerson, Dedham, 3,000 white ash,	9 00
Alfred S. Hayes, Ashland, 4,000 white ash,	12 00
Lyman E. Ware, Norfolk, 1,000 white ash and 50 white pine,	3 25
Edward Sturgis, Andover, 500 white pine,	1 50
C. N. Field, Foxborough, 100 white ash,	35
Total,	$68 35

Nursery Stock on Hand, Fall, 1907.

White ash transplants,	40,000
White pine, one year old,	200,000
White pine, two years old,	15,000
Norway spruce, one year old,	25,000
Norway spruce, two years old,	2,000
Catalpa, one year old,	3,500
Chestnut, one year old,	90
Sycamore,	200
Maple, red,	2,000
Maple, rock,	100
White pine, two years old, purchased from nurserymen,	250,000
Total,	538,790



PORTION OF THE STATE NURSERY AT AMHERST.
Showing the screen protection given evergreen seedlings.

Seed collected, 1907.

White pine,	65 pounds.
Chestnut,	1 bushel.
Box elder,	1 bushel.
Locust,	small amount.
Horse chestnut,	" "
Norway spruce,	" "
Pitch pine,	" "
Austrian pine,	" "
Tulip tree,	" "
Maple,	" "

Fifty pounds of white pine seed have also been purchased for spring distribution.

The trustees of the Agricultural College have voted additional land for next spring's use in enlarging the present area. It is believed we can well afford to do even more in growing and distributing various tree seedlings at cost. When the time comes that commercial growers are prepared to furnish them at lower rates, the States' policy will undoubtedly be to do less.

Forestry Exhibits.

Two forestry exhibits have been made by the State Forester during the year, one at the Sportsmans' Show, held at the Mechanics building in Boston last spring, and the other at the annual winter meeting of the State Board of Agriculture, held at Horticultural Hall, Boston, December 3, 4 and 5. The exhibit consisted in showing different kinds of forest seeds and seedlings of various ages. The seedlings and transplants were displayed in the ordinary seed-bed conditions, and also suspended in glass jars, so the whole root system could be shown. Photographs, forest maps, wood sections, forest implements, charts, forest fire posters and a full set of the publications of the office were also shown. A number of names of persons interested were secured, and much assistance given by way of explanation of the material at hand. After making the last exhibition the material was moved into a room adjoining this office in the State House, where it is being used for demonstration purposes.

Co-operation with the United States Forest Service.

The State Forester wishes here to acknowledge the hearty co-operation that Mr. Gifford Pinchot and his able assistants have rendered whenever called upon. When requests have gone in to the United States Forest Service for assistance on examinations, lectures, etc., from Massachusetts, they have been referred to this office by the Forest Service, and we have gladly co-operated in the work.

Examination of Woodlands and Practical Assistance given Owners.

This work has been one of the strong features of the office from the first, and nothing has been left unturned to make the work effective and helpful to as many applicants as we were able to assist during the year.

All the work heretofore done by my predecessor in office was carefully gone over, and in as many cases as possible the actual field examined. In every case of which there is a record in the office, the owner was either seen personally or addressed, in order to know just how effective the assistance has been. Not only was this system carried out with the examinations and assistance of this office, but the United States Forest Service heartily co-operated in sending a complete set of the working plans and names of persons from Massachusetts who had been assisted not only before this office was established but up to the present. This, therefore, gives us the data at hand of practically all of the examinations and assistance given in the State.

After completing the above list, each person receiving assistance was requested to furnish an up-to-date report of just what he had actually accomplished. The information thus received has been very valuable in guiding the work this year. Unfortunately, there were many instances where the assistance has resulted in nothing but an expense to the State, in that there seems to be little likelihood of its ever being made use of. This is particularly true of some of the most elaborate and expensive work this office has done. After trying to renew an interest in carrying out the original plan of these earlier applicants, the attention of the office was turned to the assistance of new applicants.

There were found to be 86 citizens on record as having had

woodland examinations. Of this number, 41 replies were received, 23 of which were carrying out the suggestions offered, and 8 wished further assistance. Upon studying the problem, it was found that to make the work effective something more than just a working plan and the giving of written advice are necessary to accomplish the success desired.

Mr. J. J. Dearborn of the Harvard Forestry School, and a young man of much practical forestry experience, was put in charge of this work. We followed out the policy of first meeting the owner upon his property, and of going over the proposed woodland proposition and getting as near as possible his needs and purposes. We then interested him in so far as practicable to determine what should and could be done, provided further plans and assistance were given. We have made 37 new examinations during the past year. Of this number, 33 are following out or contemplating the advice given. By contemplating is meant that they have already placed orders for seedlings, or shown definite indications of doing something either this winter or next spring.

Markings for thinnings have been made over different tracts, amounting in area to some 50 to 100 acres. In almost every case where a thinning was advised, enough was actually done to convey, as an example, the right idea to the owner.

The actual superintendence of the thinning out of one tract has been performed by the office, in order to demonstrate its practicability and secure definite data which is to be used in illustrating methods and results.

The largest tract that the office has undertaken is one of 1,600 acres, in the Berkshires. The field work and data have been secured for this tract, but the making of the map and report of office work end is still in progress. As a result of our assistance, the owner of this tract has employed as a permanent forester a graduate of the Harvard Forestry School of last year. The other tracts examined have been much smaller in area, although a number are of fair proportions, as Massachusetts woodlands run.

We have now several new applications on hand for examinations, one application for a working plan, and some requests for markings for thinnings.

In order to keep in touch with the cost of operations and

stumpage values, circular letters and schedules to be filled out have been sent to the lumbermen and dealers in different sections of the State.

Technological Work.

During the past summer measurements were made by this office looking towards the construction of a yield table for white pine. A yield table is one which shows the amount of wood per acre that one can expect to obtain from pure even-aged stands of pine at different ages and for different localities. It is especially valuable to predict the yield of planted stands, since such stands are most likely to fulfill the conditions of the table. To make such a table it is necessary to select a large number of sample plots, one-quarter or one-eighth acre in size, taking care that the plots represent a great variety of ages, and as broad a range of locality and growing conditions as one can expect to find in a State of the size of Massachusetts. All the trees on the sample plots are measured for diameter and height, and the amount of lumber in each obtained from volume tables.

This work was in charge of Mr. H. O. Cook of this office, who had the assistance of Messrs. W. G. Howard and R. F. Weston of the Harvard Forest School, and Mr. R. C. Hall of the Yale Forest School. During two months, July and August, they measured one hundred and seventy-eight plots, in fifty-two towns. The accompanying map shows the towns and gives a clue to the number of plots measured in each. Other towns were visited, but as no plots were measured in them, no record of them was kept.

The travelling was largely done on foot; wood-using factories were visited, fire wards interviewed, and in various ways a great deal of general but valuable information on the forest growth, lumber prices, and on other subjects of interest to foresters was picked up and made note of.

The accompanying map is not alone useful in connection with the yield table work, but it gives some clue to the pine distribution in the State. The sections visited were naturally the leading pine-growing regions, and within these regions the amounts in the different towns are roughly proportional to the number of sample plots measured in those towns. The region of greatest production is in the northern part of Worcester County, together


LOCATION OF SAMPLE PLOTS
YIELD TABLES
FOR
WHITE PINE
ESSEX
FRANKLIN
MIDDLESEX
BERKSHIRE
WORCESTER
HAMPSHIRE
NORFOLK
HAMPDEN
PLYMOUTH
BRISTOL
BARNSTABLE
DUKES
NANTUCKET
BRISTOL
1 ACUSHNET
2 FAIRHAVEN
BERKSHIRE
1 PITTSFIELD
2 LENOX
3 STOCKBRIDGE
4 LEE
5 DALTON
ESSEX
1 HAVERHILL
2 LAWRENCE
FRANKLIN
1 WARWICK
2 ORANGE
3 WENDELL
4 NEW SALEM
HAMPSHIRE
1 AMHERST
2 BELCHERTOWN
NORFOLK
1 MEDWAY
2 BELLINGHAM
MIDDLESEX
1 ASHBY
2 TOWNSEND
3 PEPPERELL
4 DUNSTABLE
5 TYNGSBORO
6 TEWKSBURY
7 WILMINGTON
8 BILLERICA
9 BURLINGTON
10 BEDFORD
11 CONCORD
WORCESTER
1 ROYALSTON
2 WINCHENDON
3 ASHBURNHAM
4 ATHOL
WORCESTER CON
1 PHILLIPSTON
6 GARDNER
7 TEMPLETON
8 WESTMINSTER
9 PETERSHAM
10 DANA
11 BARRE
12 HUBBARDSTON
13 PRINCETON
14 BROOKFIELD
15 SPENCER
16 STURBRIDGE
17 CHARLTON
18 SOUTHBRIDGE
19 DUDLEY
20 WEBSTER
LEGEND
1 and 2 Plots
2 to 5 Plots
5 to 10 Plots
10 plus Plots

with adjoining portions of Franklin and Middlesex counties. Petersham, where twenty-three sample plots were measured, is the banner town of this region and of the State.

The growth of individual pine trees, as well as the growth of acre stands has been studied by making what are known to foresters as stem analyses on more than two hundred and fifty trees. Where cutting is going on, trees are selected and the separate logs are measured for length, diameter and the growth for ten-year periods, as shown by the annual rings. The growth of the various logs together with the stump and the top when put together make up the growth of the entire tree. The individual trees are then assigned to certain types of growth, and tables constructed which will show the rate of growth of pine under varying conditions, and its rate of growth at different ages.

The yield tables, the growth tables and other information concerning the white pine as it grows in this State will soon be published in bulletin form.

Yield per Acre from thinning Pure, fully stocked White Pine.

Age (Years).	Trees Five Inches or More in Diameter.				All Trees.			
	Board Feet.	Stumpage at $6 per M.	Value at $16 per M.	Cubic Feet.	Cords.	Value at $5 per Cord.	Stumpage at $4 per Cord.	Cubic Feet.
25, .	1,400	$8 40	$22 40	280	11.0	$55 00	$44 00	880
30, .	3,700	22 20	59 20	720	12.0	60 00	48 00	1,040
35, .	4,950	29 70	79 20	850	12.3	61 50	49 20	1,090
40, .	6,000	36 00	96 00	1,030	12.8	64 00	51 20	1,150
45, .	6,800	40 80	108 80	1,140	13.0	65 00	52 00	1,190
50 .	7,400	44 40	118 40	1,240	13.4	67 00	53 60	1,240
55 .	7,900	49 40	126 40	1,310	14.0	70 00	56 00	1,310

The above table shows the yield to be obtained by thinning white pine stands of different ages in cases where the stand is pure, containing no other trees but white pine, and fully stocked, — that is, without pronounced holes or blanks.

The table is divided into two parts, one for trees five inches or more in breast-high diameter, the volumes of which are indicated in broad measure. The corresponding money values are given,— in the second column the stumpage value at $6 per thousand, and

in the third column the value of the lumber at $16 per thousand. The stumpage value is purposely put low, because in general the material taken out in thinnings is not of the highest quality, and is more expensive to get out than if the stand is cut clean.

In the second part trees of all sizes are included, and their volume is given in cords. Stumpage is reckoned at the rate of $4 a cord. The value ($5) used in the second column is the price usually obtained by owners who cut and haul their own wood to the mill in small lots. If $1 is allowed for the labor of chopping and $1 for the hauling, it will be seen that by this method the farmer gets a stumpage rate of only $3, which is less than the common rate. This method of operating, however, has certain advantages in making thinnings: first, because any quantity of material, no matter how small, can be cut and sold; second, the cutting, when done by the owner, is sure to be done carefully, and this is important in making thinnings; third, if the work is done during the winter, when the farmer and his team have little to do, the entire $5 can be regarded as clear profit.

Forest Map.

Two years ago the State Forester started the construction of a forest map of the State, through the agency of the census department. Agents of this department were provided with maps of all the towns in the State, visited the assessors of each town, and from their collective knowledge had them sketch on the maps the forest area, with notes on the kind of growth thereon. This method is at best rather a crude form of map making, and the data inaccurate, even though many of the maps have been corrected by members of this office. Until a more costly and better map can be made, however, it provides our best means for getting at the forest growth of the State and its area. The forest area so taken has been measured by this office, and the results of these measurements are given in the adjoined list.

The growth is divided into three main types: the pine type, — woodland containing over seventy-five per cent white pine; woodland consisting wholly of hard woods; and a mixed type of hard woods, in which are scattering pines and perhaps other conifers, as spruce and hemlock. In the last column are placed some

miscellaneous growths, not of great importance in the aggregate, but prominent in the towns in which they are situated.

Scrub means land covered with acorn brush, or a land covered with young growth of no commercial value.

Pitch pine, in Barnstable, Dukes and Nantucket counties, is put in the pine type.

The cedar referred to is the white cedar (*Chamæcyparis thyoides*) of the swamps, and not the red cedar.

In drawing conclusions from these figures, it is to be noted that the larger the area used the more accurate will the results be; that is, the figures for a county are more accurate than those for a town, and those for the State more accurate than the figures for any county. The columns of per cent. which give the amount of forest land relative to the total area, or the amount of land in each type relative to the total *forest* area, offer a better means of comparing different towns or counties than the figures of acreage.

Thirty-seven per cent. of the acreage of the State is in forest land; but if Suffolk and Nantucket counties are omitted, the percentage is raised to forty. We add to this an amount sufficient to make up for waste land that should be in forest, and we have about fifty per cent. of the total area of the State available for forest purposes.

Barnstable County.

City or Town.	Area (Acres).	Forest Area (Acres).	Per Cent.	Pine Types.	Per Cent.	Hard-wood Types.	Per Cent.	Mixed Types.	Per Cent.	Miscellaneous Types.	Per Cent.
Barnstable,	40,367	20,447	51.0	–	–	–	–	15,744 [1]	71.0	4,733 [2]	29.0
Bourne,	26,584	17,792	67.0	–	–	–	–	14,400	82.0	3.392 [2]	18.0
Brewster,	16,103	8,480	53.0	–	–	–	–	8,480 [1]	100.0	–	–
Chatham,	10,442	1.754	17.0	–	–	–	–	1,619	–	135 [2]	8.0
Dennis,	14,016	6,496	46.0	–	–	–	–	4,128 [1]	65.0	2,368 [2]	35.0
Eastham,	9,341	2,688	29.0	2,170 [3]	95.0	–	–	–	–	520 [2]	5.0
Falmouth,	29,260	21,344	73.0	–	–	–	–	10,976 [1]	50.0	10,368 [2]	50.0
Harwich,	14,340	8,800	61.0	2,790 [3]	25.0	–	–	5,120 [1]	65.0	895 [2]	10.0
Mashpee,	16,617	13,217	80.0	2,855 [3]	20.0	1,375	10.0	8,820	70.0	–	–
Orleans,	9,081	1,517	17.0	128 [3]	9.0	493	33.0	864	56.0	–	–
Provincetown,	5,600	960	17.0	–	–	64	8.0	896	92.0	–	–
Sandwich,	28,033	18,850	67.0	–	–	4,450	3.0	18,400	97.0	–	–
Truro,	13,825	5,360	40.0	–	–	–	–	160 [4]	3.0	5,200 [2]	97.0
Wellfleet,	13,326	2,830	48.0	1,517 [3]	52.0	–	–	320	12.0	990 [2]	36.0
Yarmouth,	16,338	9,600	51.0	3,810 [3]	40.0	–	–	5,280	45.0	512 [2]	15.0
Totals,	263,273	140,135	53.0	13,270	9.4	6,382	4.6	95,207	68.0	29,113	18.0

Berkshire County.

Adams,	14,976	8,436	56.0	416	5.0	90	1.0	7,930	94.0	–	–
Alford,	7,104	2,708	38.0	96	3.0	2,272	84.0	340	13.0	–	–
Becket,	32,896	19,771	60.0	–	–	2,413	12.0	16,583	84.0	775 [5]	4.0
Cheshire,	18,304	10,419	57.0	1,216	12.0	3,564	34.0	5,287	51.0	352 [5]	3.0
Clarksburg,	7,936	6,831	76.0	–	–	4,872	74.0	1,959	26.0	–	–
Dalton,	13,824	8,749	63.0	–	–	–	–	8,749	100.0	–	–
Egremont,	12,224	4,896	40.0	512	10.0	3,970	82.0	256	5.0	128 [6]	3.0
Florida,	12,800	10,389	84.0	–	–	378	3.0	7,136	69.0	2,875 [7]	28.0
Great Barrington,	31,168	14,377	46.0	256	2.0	11,648	81.0	2,395	17.0	–	–
Hancock,	24,128	15,306	63.0	–	–	14,074	92.0	1,102	7.0	130 [7]	1.0
Hinsdale,	13,696	8,160	59.0	32	–	–	–	4,608	56.0	3,520 [7]	44.0
Lanesborough,	18,816	9,205	49.0	1,274	14.0	4,961	54.0	2,560	28.0	410 [7]	4.0
Lee,	16,256	9,832	60.0	640	6.0	1,051	12.0	8,032	82.0	–	–
Lenox,	15,360	7,900	51.0	832	11.0	4,033	51.0	2,778	36.0	257 [5]	2.0

Monterey,	17,048	9,672	57.0	1,396	14.0	7,040	73.0	1,236	13.0	–	–
Mount Washington,	14,400	13,132	91.0	352	3.0	12,652	96.0	–	–	147[5]	1.0
New Ashford,	8,320	6,822	82.0	–	–	–	–	6,720	98.0	102[7]	2.0
New Marlborough,	30,976	13,690	44.0	800	6.0	4,813	35.0	7,168	53.0	909[5]	6.0
North Adams,	12,160	6,701	55.0	–	–	941	15.0	5,536	82.0	221[7]	3.0
Otis,	24,192	12,055	50.0	2,227	19.0	6,961	57.0	2,867	24.0	–	–
Peru,	17,344	8,480	49.0	–	–	2,848	34.0	1,408	16.0	4,224[7]	50.0
Pittsfield,	26,944	7,981	29.0	928	12.0	6,061	76.0	992	12.0	–	–
Richmond,	11,776	5,862	50.0	736	13.0	1,696	29.0	3,292	56.0	134[6]	2.0
Sandisfield,	33,984	17,984	53.0	192	1.0	6,656	37.0	11,136	62.0	–	–
Savoy,	25,152	13,875	55.0	96	1.0	–	–	9,888	71.0	3,891[5]	28.0
Sheffield,	32,448	12,844	39.0	1,120	9.0	7,040	54.0	4,384	34.0	300[7]	3.0
Stockbridge,	14,144	5,152	36.0	288	6.0	4,736	92.0	–	–	128[7]	2.0
Tyringham,	12,800	7,763	61.0	346	5.0	6,668	86.0	749	9.0	–	–
Washington,	25,280	18,134	72.0	282	2.0	11,494	63.0	4,576	25.0	1,741[7]	10.0
West Stockbridge,	11,648	5,453	47.0	–	–	4,525	83.0	928	17.0	–	–
Williamstown,	31,360	18,477	59.0	128	1.0	7,552	41.0	8,928	48.0	1,869[6]	10.0
Windsor,	21,440	9,018	42.0	192	2.0	5,549	62.0	576	6.0	2,701[5]	30.0
Totals,	630,904	330,074	54.0	14,357	4.0	150,558	47.0	140,099	42.0	24,917	7.0

Bristol County.

Acushnet,	12,041	2,778	23.0	698	25.0	–	–	1,184	42.0	896[2]	33.0
Attleborough,	17,774	2,804	16.0	96	3.0	1,428	50.0	1,280	47.0	–	–
Berkley,	10,496	1,748	17.0	340	20.0	–	–	1,408	80.0	–	–
Dartmouth,	39,578	20,606	50.0	640	3.0	6,458	31.0	11,098	54.0	2,410[2]	12.0
Dighton	14,306	1,255	9.0	32	3.0	192	15.0	1,031	82.0	–	–
Easton,	18,845	12,194	65.0	39	–	1,440	11.0	7,533	61.0	3,182[2]	28.0
Fairhaven,	7,934	1,517	19.0	269	17.0	1,152	77.0	96	6.0	–	–
Fall River,	24,372	5,152	21.0	320	6.0	1,984	38.0	1,056	20.0	1,792[8]	36.0
Freetown,	23,173	6,791	29.0	1,696	25.0	–	–	4,429	65.0	666[8]	10.0
Mansfield,	13,012	8,000	61.0	83	1.0	896	11.0	6,893	86.0	1,440[8]	61.0
New Bedford,	12,669	2,432	19.0	192	8.0	–	–	800	33.0	653[2]	28.0
North Attleborough,	12,452	2,253	18.0	192	8.0	704	32.0	704	32.0	32[2]	–
Norton,	18,817	7,052	38.0	96	1.0	928	14.0	5,996	85.0	736[8]	10.0
Raynham,	13,263	7,839	59.0	154	2.0	1,760	23.0	5,189	65.0	–	–

[1] Pitch pine and hardwoods mixed.
[2] Scrub growth.
[3] Pitch pine.
[4] Pitch pine and cedar mixed.
[5] Spruce and hemlock mixed.
[6] Hemlock growth.
[7] Spruce growth.
[8] Cedar swamp.

Bristol County — Concluded.

City or Town.	Area (Acres).	Forest Area (Acres).	Per Cent.	Pine Types.	Per Cent.	Hard-wood Types.	Per Cent.	Mixed Types.	Per Cent.	Miscellaneous Types.	Per Cent.
Rehoboth,	30,372	7,117	23.0	640	12.0	2,250	30.0	4,225	–	–	–
Seekonk,	11,957	1,856	16.0	–	–	147	8.0	1,709	92.0	90[1]	8.0
Somerset,	5,546	730	13.0	–	–	–	–	640	92.0	–	–
Swansea,	14,587	1,011	7.0	–	–	1,011	100.0	–	–	–	–
Taunton,	31,099	14,445	45.0	160	1.0	2,349	16.0	11,008	77.0	928[1]	6.0
Westport,	35,349	9,613	27.0	512	5.0	1,325	14.0	6,304	66.0	1,412[1]	15.0
Totals,	367,642	117,193	32.0	6,149	5.0	24,024	20.0	72,583	68.0	14,300	16.0

Dukes County.

Chilmark,	14,181	3,975	28.0	–	–	–	–	2,995	75.0	980[1]	25.0
Edgartown,	18,718	6,920	37.0	–	–	2,407	30.0	3,170	48.0	1,345[1]	22.0
Gay Head,	4,062	378	9.0	–	–	290	75.0	–	–	90[1]	25.0
Gosnold,	8,286	1,410	17.0	130[2]	9.0	320	21.0	960	70.0	–	–
Oak Bluffs,	4,642	1,568	34.0	–	–	–	–	1,408	90.0	160[1]	10.0
Tisbury,	4,825	2,080	43.0	–	–	1,280	60.0	8,000[2]	40.0	–	–
West Tisbury,	17,072	7,455	44.0	192[2]	3.0	–	–	1,825	87.0	735[1]	10.0
Totals,	71,786	23,786	33.0	322	1.5	4,297	17.0	18,358	77.0	3,310	15.0

Essex County.

Amesbury,	8,841	1,961	22.0	519	26.0	1,442	74.0	–	–	–	–
Andover,	20,471	6,575	33.0	954	15.0	4,237	64.0	1,294	21.0	–	–
Beverly,	7,781	3,264	45.0	320	10.0	–	–	2,944	90.0	–	–
Boxford,	15,611	9,668	66.0	868	9.0	5,056	52.0	3,744	39.0	–	–
Danvers,	8,857	1,647	18.0	131	8.0	288	18.0	1,178	74.0	–	–
Essex,	9,201	3,264	35.0	–	–	–	–	3,264	100.0	–	–
Georgetown,	8,496	4,621	54.0	160	4.0	3,341	72.0	1,120	24.0	–	–

Gloucester,	16,929	5,963	35.0	77	1.0	154	3.0	5,732	96.0	–	–
Groveland,	5,994	3,565	60.0	256	7.0	461	13.0	2,848	80.0	–	–
Hamilton,	9,594	3,776	39.0	32	1.0	256	7.0	3,488	92.0	–	–
Haverhill,	22,818	3,207	14.0	576	18.0	935	29.0	1,696	53.0	–	–
Ipswich,	21,340	5,448	26.0	–	–	2,228	40.0	3,220	60.0	–	–
Lawrence,	4,636	1,198	26.0	115	10.0	1,011	84.0	71	6.0	–	–
Lynn,	7,177	2,798	42.0	–	–	–	–	2,798	100.0	–	–
Lynnfield,	6,713	3,514	52.0	–	–	589	17.0	2,925	83.0	–	–
Manchester,	4,940	2,791	57.0	–	–	–	–	2,791	100.0	–	–
Marblehead,	2,831	269	9.0	–	–	–	–	269	100.0	–	–
Merrimac,	5,778	1,946	33.0	378	19.0	448	24.0	1,120	57.0	–	–
Methuen,	14,752	5,070	34.0	96	2.0	2,605	51.0	2,369	47.0	–	–
Middleton,	9,256	6,568	71.0	359	6.0	4,532	69.0	1,677	25.0	–	–
Nahant,	680	–	–	–	–	–	–	–	–	–	–
Newbury,	15,577	2,368	15.0	32	1.0	2,240	95.0	–	–	96[2]	4.0
Newburyport,	5,696	685	12.0	256	37.0	429	63.0	–	–	–	–
North Andover,	17,810	7,277	41.0	160	2.0	6,669	92.0	448	6.0	–	–
Peabody,	10,758	4,717	44.0	352	7.0	4,365	93.0	–	–	–	–
Rockport,	4,529	1,010	22.0	58	6.0	37	4.0	915	90.0	–	–
Rowley,	12,180	2,415	20.0	–	–	1,103	46.0	1,312	54.0	–	–
Salem,	5,233	2,077	40.0	–	–	–	–	384	18.0	1,692[3]	82.0
Salisbury,	10,325	2,446	24.0	–	–	96	4.0	2,350	96.0	–	–
Saugus,	7,412	2,112	28.0	–	–	544	26.0	1,568	74.0	–	–
Swampscott,	1,981	864	44.0	–	–	–	–	864	100.0	–	–
Topsfield,	8,228	2,650	32.0	154	6.0	301	11.0	2,195	83.0	–	–
Wenham,	5,252	1,241	24.0	38	3.0	–	–	1,203	97.0	–	–
West Newbury,	9,381	1,062	11.0	–	–	1,062	100.0	–	–	–	–
Totals,	326,660	108,537	33.0	5,891	4.0	44,429	43.0	55,787	51.0	2,688	2.0

Franklin County.

Ashfield,	25,408	9,325	37.0	128	1.0	2,208	24.0	6,989	75.0	–	–
Bernardston,	14,144	4,864	34.0	32	–	–	–	4,832	100.0	–	–
Buckland,	12,864	5,908	46.0	–	–	–	–	5,908	100.0	–	–
Charlemont,	16,896	8,052	48.0	–	–	–	–	8,052	100.0	–	–
Colrain,	20,480	15,866	77.0	–	–	6,464	41.0	9,402	59.0	–	–
Conway,	24,128	10,708	44.0	192	2.0	5,172	48.0	5,344	50.0	–	–

[1] Scrub growth. [2] Pitch pine. [3] Cedar swamp.

Franklin County — Concluded.

City or Town.	Area (Acres).	Forest Area (Acres).	Per Cent.	Pine Types.	Per Cent.	Hard-wood Types.	Per Cent.	Mixed Types.	Per Cent.	Miscellaneous Types.	Per Cent.
Deerfield,	22,528	9,511	42.0	423	5.0	–	–	9,088	95.0	–	–
Erving,	9,216	3,873	42.0	77	2.0	1,044	28.0	2,752	70.0	–	–
Gill,	9,344	1,613	17.0	480	29.0	877	54.0	256	17.0	–	–
Greenfield,	12,800	2,624	21.0	–	–	448	16.0	2,176	84.0	–	–
Hawley,	19,712	9,184	47.0	–	–	768	9.0	8,416	91.0	–	–
Heath,	16,000	5,549	35.0	–	–	960	17.0	4,589	83.0	–	–
Leverett,	14,232	6,356	45.0	256	4.0	448	7.0	5,652	89.0	–	–
Leyden,	18,240	3,956	22.0	–	–	1,204	32.0	2,752	68.0	–	–
Monroe,	7,104	4,397	62.0	–	–	173	4.0	2,317	53.0	1,907[1]	43.0
Montague,	19,456	4,841	24.0	–	–	1,184	24.0	3,657	76.0	–	–
New Salem,	19,264	9,018	46.0	3,789	38.0	813	9.0	4,416	45.0	880[2]	9.0
Northfield,	22,784	6,650	29.0	288	4.0	2,599	39.0	3,763	57.0	–	–
Orange,	23,684	10,208	43.0	1,683	17.0	4,096	40.0	4,429	43.0	–	–
Rowe,	15,424	6,816	44.0	–	–	288	4.0	6,528	96.0	–	–
Shelburne,	15,104	6,720	44.0	384	6.0	–	–	6,336	94.0	–	–
Shutesbury,	17,024	9,479	55.0	115	1.0	429	4.0	8,935	95.0	–	–
Sunderland,	8,960	1,472	17.0	128	1.0	–	–	1,344	99.0	–	–
Warwick,	23,936	10,112	42.0	1,824	18.0	435	4.0	7,853	78.0	–	–
Wendell,	20,672	5,664	27.0	474	9.0	2,592	45.0	2,598	46.0	–	–
Whately,	12,160	1,683	14.0	–	–	1,683	100.0	–	–	–	–
Totals,	441,560	224,849	50.0	10,273	4.0	34,085	39.0	128,385	57.0	2,787	2.0

Hampden County.

Agawam,	16,000	2,996	19.0	352	11.0	1,364	46.0	1,280	43.0	–	–
Blandford,	33,920	13,550	40.0	429	4.0	7,271	53.0	5,850	43.0	–	–
Brimfield,	22,528	8,385	37.0	224	3.0	3,533	42.0	4,628	55.0	–	–
Chester,	23,040	12,096	52.0	–	–	7,424	61.0	4,672	39.0	–	–
Chicopee,	16,448	2,292	14.0	84	4.0	2,112	92.0	–	–	96[3]	4.0
East Longmeadow,	8,576	590	7.0	276	49.0	150	22.0	164	29.0	–	–
Granville,	28,992	10,977	38.0	160	1.0	564	5.0	10,253	94.0	–	–
Hampden,	12,160	4,365	36.0	52	1.0	473	11.0	3,840	88.0	–	–

Holland,	8,640	3,733	43.0	135	4.0	3,213	86.0	365	10.0	–	–
Holyoke,	10,752	2,794	26.0	–	–	–	–	2,794	100.0	–	–
Longmeadow,	7,168	310	4.0	32	10.0	182	59.0	96	31.0	–	–
Ludlow,	18,048	1,965	11.0	269	19.0	768	34.0	928	47.0	–	–
Monson,	30,592	9,780	32.0	141	2.0	7,495	76.0	2,144	22.0	–	–
Montgomery,	9,600	8,032	83.0	–	–	–	–	8,032	100.0	–	–
Palmer,	20,800	10,093	48.0	128	1.0	9,965	99.0	–	–	–	–
Russell,	12,160	6,266	51.0	–	–	1,152	18.0	4,570	73.0	544 [3]	19.0
Southwick,	14,784	3,552	24.0	–	–	1,517	43.0	2,035	57.0	1,216 [2]	20.0
Springfield,	20,608	6,106	29.0	–	–	–	–	4,890	80.0	–	–
Tolland,	20,032	9,498	47.0	1,632	17.0	1,024	11.0	6,842	72.0	–	–
Wales,	10,624	2,432	23.0	–	–	2,144	88.0	288	12.0	–	–
West Springfield,	11,712	2,306	20.0	102	5.0	192	8.0	2,012	87.0	–	–
Westfield,	31,040	2,912	8.0	–	–	128	5.0	2,784	95.0	–	–
Wilbraham,	14,720	2,891	20.0	–	–	1,427	49.0	1,402	49.0	62 [3]	2.0
Totals,	412,934	127,891	31.0	4,016	6.0	52,998	41.0	69,870	51.0	1,822	2.0

Hampshire County.

Amherst,	17,280	2,663	15.0	228	11.0	1,485	56.0	890	33.0	–	–
Belchertown,	35,264	13,415	38.0	365	3.0	3,021	22.0	10,029	75.0	–	–
Chesterfield,	20,736	8,224	39.0	–	–	1,888	23.0	6,336	77.0	–	–
Cummington,	14,592	10,973	75.0	–	–	–	–	10,480	96.0	493 [4]	4.0
Easthampton,	9,152	2,976	32.0	–	–	–	–	2,976	100.0	–	–
Enfield,	11,200	5,005	45.0	–	–	2,861	57.0	2,144	43.0	–	–
Goshen,	10,944	3,905	36.0	244	6.0	589	16.0	3,070	78.0	–	–
Granby,	17,600	4,295	24.0	–	–	2,727	63.0	1,568	37.0	–	–
Greenwich,	12,800	3,648	29.0	–	–	704	20.0	2,944	80.0	–	–
Hadley,	15,872	1,691	11.0	–	–	302	18.0	1,389	82.0	–	–
Hatfield,	11,072	3,520	32.0	–	–	–	–	3,520	100.0	–	–
Huntington,	17,408	7,060	40.0	–	–	2,208	32.0	4,852	68.0	–	–
Middlefield,	15,488	9,792	63.0	–	–	3,680	38.0	6,112	62.0	–	–
Northampton,	25,920	7,277	28.0	–	–	7,277	100.0	–	–	–	–
Pelham,	16,064	7,654	47.0	–	–	832	12.0	6,822	88.0	525 [4]	8.0
Plainfield,	13,952	6,618	47.0	–	–	96	1.0	5,997	91.0	–	–
Prescott,	11,712	4,339	37.0	832	19.0	–	–	3,507	81.0	–	–
South Hadley,	11,840	2,720	23.0	–	–	–	–	2,720	100.0	–	–

[1] Spruce growth. [2] Pitch pine. [3] Hemlock growth. [4] Spruce and hemlock mixed.

Hampshire County — Concluded.

City or Town.	Area (Acres).	Forest Area (Acres).	Per Cent.	Pine Types.	Per Cent.	Hard-wood Types.	Per Cent.	Mixed Types.	Per Cent.	Miscellaneous Types.	Per Cent.
Southampton,	17,472	10,983	63.0	–	–	–	–	10,983	100.0	–	–
Ware,	18,752	2,904	15.0	–	–	1,619	56.0	1,285	44.0	–	–
Westhampton,	17,792	11,712	65.0	–	–	11,712	100.0	–	–	–	–
Williamsburg,	16,320	8,730	53.0	448	5.0	5,191	58.0	3,091	37.0	–	–
Worthington,	20,800	6,893	33.0	96	1.0	806	13.0	5,991	86.0	–	–
Totals,	380,032	146,997	38.0	2,213	2.0	46,998	32.0	96,706	65.0	1,018	1.0

Middlesex County.

Acton,	12,999	2,603	20.0	640	24.0	1,213	46.0	750	30.0	–	–
Arlington,	3,577	369	10.0	–	–	231	63.0	138	37.0	–	–
Ashby,	14,912	5,372	36.0	660	12.0	2,580	48.0	2,132	40.0	–	–
Ashland,	23,037	1,726	8.0	26	1.0	1,501	87.0	199	12.0	–	–
Ayer,	5,980	3,003	50.0	218	7.0	1,754	59.0	1,031	34.0	–	–
Bedford,	8,867	4,378	49.0	480	11.0	1,818	42.0	2,080	47.0	–	–
Belmont,	2,981	674	22.0	–	–	674	100.0	–	–	–	–
Billerica,	16,617	6,772	41.0	538	9.0	2,432	35.0	3,802	56.0	–	–
Boxborough,	6,648	3,021	45.0	224	7.0	941	31.0	1,856	62.0	–	–
Burlington,	7,603	2,881	38.0	116	4.0	1,325	46.0	1,440	50.0	–	–
Cambridge,	4,570	–	–	–	–	–	–	–	–	–	–
Carlisle,	9,884	4,071	41.0	160	4.0	1,287	32.0	2,624	64.0	–	–
Chelmsford,	14,693	5,768	32.0	960	17.0	3,124	55.0	1,684	28.0	–	–
Concord,	16,492	4,705	–	461	10.0	4,052	86.0	192	4.0	–	–
Dracut,	13,631	7,021	51.0	365	5.0	2,368	33.0	4,288	62.0	–	–
Dunstable,	10,993	3,060	28.0	52	2.0	1,120	38.0	1,888	60.0	–	–
Everett,	2,396	–	–	–	–	–	–	–	–	–	–
Framingham,	45,408	5,155	11.0	16	–	1,407	28.0	3,732	72.0	–	–
Groton,	17,278	5,741	33.0	–	–	3,136	55.0	2,605	45.0	–	–
Holliston,	39,947	4,247	16.0	160	4.0	2,592	61.0	1,495	35.0	–	–
Hopkinton,	17,408	7,022	43.0	224	3.0	5,940	85.0	653	9.0	205[1]	3.0
Hudson,	7,559	3,034	40.0	52	2.0	2,226	73.0	756	25.0	–	–
Lexington,	10,641	2,400	23.0	192	8.0	1,344	56.0	864	36.0	–	–

Lincoln,	9,550	3,693	37.0	–	–	2,637	71.0	1,056	29.0	–	–
Littleton,	11,104	4,736	43.0	192	4.0	2,944	63.0	1,600	33.0	–	–
Lowell,	7,941	1,172	15.0	384	33.0	435	37.0	353	30.0	–	–
Malden,	3,285	717	22.0	77	11.0	608	85.0	32	4.0	–	–
Marlborough,	14,105	3,399	24.0	263	8.0	2,848	84.0	288	8.0	–	–
Maynard,	3,426	1,427	41.0	–	–	659	46.0	768	54.0	–	–
Medford,	5,632	2,176	39.0	–	–	–	–	2,176	100.0	–	–
Melrose,	3,070	1,472	46.0	256	17.0	352	24.0	864	59.0	–	–
Natick,	28,426	2,112	7.0	–	–	2,112	100.0	–	–	–	–
Newton,	18,331	1,562	8.0	77	5.0	1,197	77.0	288	18.0	–	–
North Reading,	8,661	4,832	56.0	–	–	–	–	4,832	100.0	–	–
Pepperell,	14,711	5,729	39.0	640	11.0	4,596	81.0	493	8.0	–	–
Reading,	6,306	2,017	32.0	224	11.0	807	40.0	986	49.0	–	–
Sherborn,	30,440	3,670	12.0	320	10.0	1,216	32.0	2,134	58.0	–	–
Shirley,	14,241	3,616	25.0	–	–	1,139	31.0	2,477	69.0	–	–
Somerville,	2,634	–	–	–	–	–	–	–	–	–	–
Stoneham,	4,264	2,016	47.0	–	–	–	–	2,016	100.0	–	–
Stow,	11,478	3,328	29.0	416	12.0	1,220	37.0	1,792	51.0	–	–
Sudbury,	15,677	6,016	38.0	1,120	18.0	1,408	24.0	3,488	58.0	–	–
Tewksbury,	14,531	6,758	46.0	1,344	20.0	2,630	39.0	2,784	41.0	–	–
Townsend,	20,608	7,745	37.0	643	9.0	1,959	21.0	5,496	61.0	622 [2]	9.0
Tyngsborough,	11,427	3,571	31.0	–	–	915	24.0	2,656	76.0	–	–
Wakefield,	5,047	1,779	35.0	19	1.0	192	11.0	1,024	88.0	–	–
Waltham,	8,650	3,727	43.0	15	–	3,712	100.0	–	–	–	–
Watertown,	2,670	160	6.0	–	–	160	100.0	–	–	–	–
Wayland,	10,160	1,760	17.0	–	–	1,440	82.0	320	18.0	–	–
Westford,	19,838	7,053	35.0	685	9.0	704	10.0	5,664	71.0	–	–
Weston,	11,111	6,093	55.0	640	10.0	1,409	22.0	4,044	68.0	–	–
Wilmington,	10,959	3,917	36.0	1,248	30.0	704	20.0	1,965	50.0	–	–
Winchester,	4,018	967	24.0	–	–	–	–	967	100.0	–	–
Woburn,	8,388	2,419	28.0	166	7.0	205	8.0	2,048	85.0	–	–
Totals,	657,831	182,662	28.0	14,050	10.0	31,077	44.0	86,819	46.0	827	0.5

Nantucket County.

Nantucket,	32,221	1,164	3.6	1,100 [2]	95.0	–	–	64	5.0	–	–

[1] Cedar swamp.

[2] Pitch pine.

Norfolk County.

City or Town.	Area (Acres).	Forest Area (Acres).	Per Cent.	Pine Types.	Per Cent.	Hard-wood Types.	Per Cent.	Mixed Types.	Per Cent.	Miscellaneous Types.	Per Cent.
Avon,	2,876	1,357	47.0	–	–	435	31.0	922	69.0	–	–
Bellingham,	12,073	5,952	49.0	416	6.0	4,096	68.0	1,440	26.0	–	–
Braintree,	9,223	3,911	42.0	39	1.0	2,688	67.0	1,184	32.0	–	–
Brookline,	4,367	–	–	–	–	–	–	–	–	–	–
Canton,	12,404	6,883	56.0	352	5.0	6,051	88.0	480	7.0	–	–
Cohasset,	6,438	3,008	46.0	–	–	2,336	77.0	672	23.0	–	–
Dedham,	10,790	2,279	21.0	–	–	–	–	2,279	100.0	–	–
Dover,	15,306	5,933	39.0	–	–	3,213	54.0	2,720	46.0	–	–
Foxborough,	23,412	6,464	28.0	–	–	–	–	6,464	100.0	–	–
Franklin,	17,282	8,604	49.0	276	3.0	916	10.0	7,412	87.0	–	–
Holbrook,	4,687	3,200	67.0	–	–	–	–	3,200	100.0	–	–
Hyde Park,	2,932	724	24.0	–	–	–	–	724	100.0	–	–
Medfield,	9,293	2,875	31.0	692	24.0	589	20.0	1,434	51.0	160[1]	5.0
Medway,	7,463	3,412	45.0	64	2.0	1,856	54.0	1,492	44.0	–	–
Millis,	7,850	3,648	46.0	51	1.0	3,136	87.0	461	12.0	–	–
Milton,	8,448	3,853	45.0	64	2.0	3,789	98.0	–	–	–	–
Needham,	12,752	2,496	19.0	–	–	2,496	100.0	–	–	–	–
Norfolk,	9,825	3,597	36.0	365	10.0	704	19.0	2,528	71.0	–	–
Norwood,	6,780	1,376	20.0	–	–	1,376	100.0	–	–	–	–
Plainville,[2]	–	–	–	–	–	–	–	–	–	–	–
Quincy,	10,648	3,955	37.0	32	1.0	736	18.0	3,187	81.0	–	–
Randolph,	6,608	3,904	59.0	–	–	896	23.0	3,008	77.0	–	–
Sharon,	15,557	9,728	62.0	–	–	–	–	9,728	100.0	–	–
Stoughton,	10,492	5,664	53.0	–	–	2,848	50.0	2,816	50.0	–	–
Walpole,	13,498	7,187	53.0	–	–	2,240	31.0	4,947	69.0	–	–
Wellesley,	10,514	2,496	24.0	–	–	2,496	100.0	–	–	–	–
Westwood,	11,243	3,213	29.0	–	–	–	–	3,213	100.0	–	–
Weymouth,	11,348	4,289	38.0	20	–	288	7.0	3,872	91.0	109[1]	2.0
Wrentham,	14,516	10,918	50.0	512	5.0	5,062	46.0	5,344	49.0	–	–
Totals,	295,975	120,916	41.0	2,883	2.0	48,247	43.0	69,527	55.0	269	0.5

Plymouth County.

Abington,	6,487	4,353	67.0	32	1.0	1,920	44.0	506	12.0	1,895[3]	43.0
Bridgewater,	18,013	8,194	45.0	20	–	2,957	36.0	4,871	59.0	346[3]	5.0
Brockton,	13,745	3,914	28.0	15	–	743	19.0	1,088	28.0	2,068[3]	53.0
Carver,	25,333	6,080	24.0	640	11.0	–	–	1,376	22.0	4,064[3]	67.0
Duxbury,	15,685	9,598	61.0	128	1.0	–	–	8,912	93.0	558[3]	6.0
East Bridgewater,	11,339	5,018	44.0	237	5.0	–	–	4,557	91.0	224[3]	4.0
Halifax,	11,117	3,457	31.0	864	25.0	–	–	2,117	43.0	416[1]	12.0
Hanover,	10,124	7,546	74.0	–	–	–	–	6,458	85.0	1,088[3]	15.0
Hanson,	10,006	7,232	72.0	–	–	–	–	7,232	100.0	–	–
Hingham,	14,454	5,095	35.0	39	1.0	–	–	4,704	92.0	352[3]	7.0
Hull,	1,621	96	6.0	–	–	–	–	–	–	96[3]	100.0
Kingston,	12,180	8,519	68.0	621	7.0	–	–	2,746	33.0	5,152[3]	60.0
Lakeville,	23,140	3,694	16.0	525	14.0	2,004	54.0	621	17.0	544[1]	15.0
Marion,	9,157	3,380	36.0	768	20.0	–	–	2,612	80.0	–	–
Marshfield,	18,250	8,932	49.0	–	–	–	–	8,576	96.0	356[3]	4.0
Mattapoisett,	11,314	5,504	49.0	1,760	32.0	–	–	3,744	68.0	–	–
Middleborough,	82,725	18,963	23.0	1,664	9.0	–	–	13,107	69.0	1,907[3] 2,285[1]	10.0 12.0
Norwell,	18,502	10,943	59.0	50	–	3,712	34.0	6,125	55.0	1,056[3]	11.0
Pembroke,	14,887	4,038	27.0	141	3.0	–	–	3,622	90.0	275[3]	7.0
Plymouth,	117,406	27,168	23.0	130	–	–	–	27,038	100.0	–	–
Plympton,	9,721	3,213	33.0	205	6.0	–	–	3,008	94.0	–	–
Rochester,	23,066	9,824	42.0	3,040	31.0	–	–	6,784	69.0	–	–
Rockland,	6,471	3,776	58.0	–	–	–	–	1,600	42.0	2,176[3]	58.0
Scituate,	10,927	3,712	34.0	–	–	1,280	34.0	2,432	66.0	–	–
Wareham,	24,338	7,565	31.0	2,432	32.0	–	–	3,968	52.0	1,165[3]	16.0
West Bridgewater,	10,882	5,088	47.0	96	2.0	2,496	49.0	2,264	45.0	224[3]	4.0
Whitman	4,473	2,035	45.0	19	1.0	371	19.0	141	7.0	1,504[3]	73.0
Totals,	635,363	188,937	30.0	13,426	7.0	15,483	8.0	129,340	69.0	26,695	15.0

[1] Cedar swamp. [2] Part of Wrentham. See that town. Area, 7,350 acres. [3] Scrub growth.

Suffolk County.

City or Town.	Area (Acres).	Forest Area (Acres).	Per Cent.	Pine Types.	Per Cent.	Hard-wood Types.	Per Cent.	Mixed Types.	Per Cent.	Miscellaneous Types.	Per Cent.
Boston,	26,026	2,571	10.0	–	–	1,672	65.0	166	4.0	413 [1] 320 [2]	17.0 14.0
Chelsea,	3,543	–	–	–	–	–	–	–	–	–	–
Revere,	4,045	117	3.0	24	20.0	93	80.0	–	–	–	–
Winthrop,	2,432	–	–	–	–	–	–	–	–	–	–
Totals,	36,046	2,688	7.4	24	5.7	1,765	65.6	166	6.0	733	23.0

Worcester County.

Ashburnham,	26,624	14,375	54.0	282	2.0	8,960	62.0	5,133	36.0	–	–
Athol,	22,016	13,647	62.0	283	2.0	6,962	51.0	5,402	47.0	–	–
Auburn,	9,050	3,719	41.0	160	4.0	3,559	96.0	–	–	–	–
Barre,	29,248	13,056	45.0	384	3.0	–	–	12,672	97.0	–	–
Berlin,	8,437	1,534	18.0	135	9.0	141	9.0	1,248	82.0	–	–
Blackstone,	10,406	5,874	56.0	–	–	5,202	89.0	672	11.0	–	–
Bolton,	12,790	2,106	16.0	288	14.0	288	14.0	1,530	72.0	–	–
Boylston,	12,654	6,653	53.0	374	6.0	6,279	94.0	–	–	–	–
Brookfield,	17,728	6,183	35.0	941	15.0	128	2.0	5,114	83.0	–	–
Charlton,	28,132	14,900	53.0	1,194	8.0	13,166	88.0	640	4.0	–	–
Clinton,	4,617	514	11.0	–	–	481	94.0	33	6.0	–	–
Dana,	12,544	4,078	33.0	–	–	334	8.0	3,744	83.0	450 [1]	9.0
Douglas,	24,128	16,810	70.0	576	3.0	14,067	84.0	2,176	13.0	–	–
Dudley,	14,272	3,610	25.0	–	–	2,016	56.0	1,594	44.0	–	–
Fitchburg,	18,240	3,328	18.0	800	24.0	1,696	51.0	832	25.0	–	–
Gardner,	14,784	4,846	33.0	992	20.0	2,650	55.0	1,204	25.0	–	–
Grafton,	14,929	4,128	27.0	–	–	4,128	100.0	–	–	–	–
Hardwick,	25,600	8,212	32.0	–	–	237	3.0	7,975	97.0	–	–
Harvard,	17,267	3,770	22.0	160	4.0	256	7.0	3,354	89.0	–	–
Holden,	23,166	7,680	33.0	76	1.0	7,604	99.0	–	–	–	–
Hopedale,	3,372	1,031	31.0	–	–	1,031	100.0	–	–	–	–
Hubbardston,	26,692	13,012	58.0	3,469	27.0	7,719	59.0	1,824	14.0	–	–
Lancaster,	18,112	6,717	37.0	384	6.0	4,367	65.0	1,966	29.0	–	–

Leicester,	15,695	11,565	74.0	480	4.0	10,573	91.0	512	5.0	–	–
Leominster,	18,816	4,366	23.0	–	–	3,329	24.0	1,037	76.0	–	–
Lunenburg,	18,624	5,031	27.0	–	–	2,771	55.0	2,260	45.0	–	–
Mendon,	11,584	5,184	45.0	64	1.0	4,992	96.0	128	3.0	–	–
Milford,	9,600	2,887	30.0	–	–	2,887	100.0	–	–	–	–
Millbury,	10,752	2,938	27.0	45	2.0	2,893	98.0	–	–	–	–
New Braintree,	13,696	2,624	19.0	–	–	–	–	2,624	100.0	–	–
North Brookfield,	14,208	1,811	13.0	–	–	1,811	100.0	–	–	–	–
Northborough,	11,978	3,872	32.0	141	4.0	2,547	66.0	1,184	30.0	–	–
Northbridge,	12,160	5,600	46.0	–	–	1,542	28.0	4,058	72.0	–	–
Oakham,	13,585	3,366	25.0	–	–	–	–	3,366	100.0	–	–
Oxford,	17,528	10,100	58.0	282	3.0	9,818	97.0	–	–	–	–
Paxton,	9,855	2,467	25.0	269	11.0	–	–	2,198	89.0	–	–
Petersham,	24,448	9,363	31.0	1,536	16.0	4,064	43.0	3,763	39.0	–	–
Phillipston,	15,424	5,415	35.0	423	8.0	2,560	47.0	2,432	45.0	–	–
Princeton,	22,850	10,803	47.0	1,024	10.0	2,240	21.0	7,539	69.0	–	–
Royalston,	27,968	8,969	32.0	3,017	33.0	256	3.0	5,696	64.0	–	–
Rutland,	23,111	6,522	28.0	147	2.0	365	6.0	6,010	92.0	–	–
Shrewsbury,	13,969	3,580	26.0	28	1.0	3,552	99.0	–	–	–	–
Southborough,	9,865	2,010	20.0	435	20.0	–	–	1,575	80.0	–	–
Southbridge,	13,312	3,981	30.0	480	12.0	2,816	70.0	685	18.0	–	–
Spencer,	21,774	6,509	29.0	2,208	33.0	4,064	64.0	237	3.0	–	–
Sterling,	20,032	5,432	27.0	544	10.0	1,464	25.0	3,424	65.0	–	–
Sturbridge,	11,520	7,443	65.0	77	1.0	2,259	30.0	5,107	69.0	–	–
Sutton,	21,952	5,605	26.0	96	2.0	5,509	98.0	–	–	–	–
Templeton,	20,800	3,475	17.0	1,152	33.0	1,632	47.0	691	20.0	–	–
Upton,	13,312	6,067	45.0	122	2.0	5,164	85.0	781	13.0	–	–
Uxbridge,	19,328	9,741	50.0	205	2.0	9,344	96.0	–	–	192[3]	2.0
Warren,	18,240	5,683	31.0	–	–	3,200	56.0	2,387	42.0	96[4]	–
Webster,	9,280	3,411	37.0	83	3.0	3,328	97.0	–	–	–	–
West Boylston,	8,819	3,853	44.0	–	–	3,360	92.0	493	8.0	–	–
West Brookfield,	13,504	2,234	17.0	58	3.0	1,344	62.0	832	35.0	–	–
Westborough,	14,528	4,576	31.0	–	–	3,360	73.0	1,216	27.0	–	–
Westminster,	23,872	13,332	56.0	1,069	8.0	9,415	79.0	2,848	21.0	–	–
Winchendon,	29,120	20,544	70.0	2,016	10.0	16,256	79.0	1,952	9.0	320[2]	2.0
Worcester,	24,643	2,637	11.0	–	–	2,637	100.0	–	–	–	–
Totals,	994,560	372,779	37.5	26,597	7.1	222,923	59.8	122,048	32.7	962	0.4

[1] Scrub growth.

[2] Hemlock growth.

[3] Cedar swamp.

[4] Pitch pine.

Summary by Counties.

County.	Area (Acres).	Forest Area (Acres).	Per Cent.	Pine Types.	Per Cent.	Hard-wood Types.	Per Cent.	Mixed Types.	Per Cent.	Miscellaneous Types.	Per Cent.
Barnstable,	263,273	140,135	53.0	13,270[1]	9.4	6,382	4.6	95,207	68.0	29,113[2] 32[3]	18.0
Berkshire,	630,904	330,074	54.0	14,357	4.0	150,558	47.0	140,099	42.0	24,[illegible]7[4]	7.0
Bristol,	367,642	117,193	32.0	6,149	5.0	24,024	20.0	72,583	68.0	8,[illegible]5[2] [illegible]0[5]	5.0 2.0
Dukes,	71,786	23,786	33.0	322[1]	1.5	4,297	17.0	18,358	66.0	[illegible]0[2]	15.5
Essex,	326,660	108,537	33.0	5,891	4.0	44,429	43.0	55,787	51.0	[illegible][5] [illegible][1]	2.0
Franklin,	441,560	224,850	50.0	10,273	4.0	34,085	39.0	128,385	57.0	[illegible] 1,907[6]	–
Hampden,	412,934	127,890	31.0	4,016	6.0	52,998	41.0	69,870	51.0	1,260[4] 1,216[1]	1.0 1.0
Hampshire,	380,032	146,997	38.0	2,213	2.0	46,998	32.0	96,706	65.0	1,018[6]	1.0
Middlesex,	657,830	182,662	28.0	14,050	10.0	81,077	44.0	86,820	46.0	205[5] 622[1]	–
Nantucket,	32,220	1,164	3.6	1,100[1]	94.0	–	–	64	6.0	–	–
Norfolk,	295,975	120,916	41.0	2,883	2.0	48,247	43.0	69,527	55.0	269[5]	–
Plymouth,	635,363	188,937	30.0	13,426	7.0	15,483	8.0	129,340	69.0	23,450[2] 3,245[5]	14.0 2.0
Suffolk,	36,046	2,688	7.4	24	0.9	1,765	65.6	166	6.0	413[2] 320[7]	22.7[8]
Worcester,	994,560	372,780	37.0	26,597	7.0	222,923	60.0	122,048	33.0	192[5] 320[7]	–
State,	5,321,787	1,972,950	37.7	100,015	5.1	731,594	36.9	1,084,793	52.0	29,420[4] 11,025[5] 16,100[1] 65,021[2]	–
Total,	–	–	–	–	–	–	–	–	–	121,566	6.0

[1] Pitch pine.
[2] Scrub growth.
[3] White pine.
[4] Spruce and hemlock mixed.
[5] Cedar swamp.
[6] Spruce growth.
[7] Hemlock growth.
[8] Miscellaneou

Pine Tree Blight.

There has been much concern over a condition of the pine trees during the past season. A small [illegible] of the white pine trees in every section of the State have been affected with a malady which has caused the tips of the needles to turn brown and die. Trees thus affected were very conspicuous, and during midseason, when it was very dry, they took on a very unhealthy appearance. Some trees were more pronounced than others, depending upon just how far down the needles from the tip the so-called "blight" had spread. All trees, however, even though slightly affected, showed sickly characteristics, in that even the remaining live portions of the tree were lighter in color, and the current seasons growth was much impaired. Both large and small trees were equally troubled, but it was quite noticeable that almost invariably those trees showing the naturally weaker vitality in their struggles for existence were the ones affected. Trees that are badly affected are sure to die, as the evergreens cannot withstand defoliation, in this respect differing from deciduous trees.

As soon as the fall rains came, these trees took on a better color, and the reddish tips, so characteristic during the summer, became inconspicuous or dropped off, so that at present the trouble is not so noticeable. Whether this blight will be as bad again next season is problematical. Trees that have been affected the past season will undoubtedly show the effects in retarded growth and vitality next; and, should the trouble reassert itself, it will probably be advisable to utilize them for timber or wood. In the case of small trees which occur here and there it would be advisable to cut and burn them, as a precautionary method.

The following interview, which appeared in the Boston "Transcript," Aug. 20, 1907, gives a very clear statement of our study of the disease: —

There is much speculation throughout the State as to how serious will be this blight. Land owners who see their trees dying are writing to the State Forester on the subject, asking for information and advice; and it is apparent that it is causing deep concern. In some instances it has attacked favorite trees which from important features of ornamental schemes in parks and on private estates, and large sums of money

have been offered for treatment that shall save them and cure them. It has been the subject, also, of much scientific study, resulting in conclusions that are somewhat reassuring.

Authorities do not quite agree on the question of time within which it made its appearance in Massachusetts. Some say they have noticed it here for about eight years, while others maintain that its first appearance was three years ago; but they are agreed in the verdict that it is more prevalent this year than in any previous season. Hence the question is raised, Is the disease contagious?

On that particular point State Forester Rane is strongly convinced by his own observations. He has toured certain sections of the State thoroughly in quest of information on that subject, and has studied the woodlands to see what relation one dying tree might have to another. One of his assistants also has made a study in the field, and it is believed that when all the data are pieced together Professor Rane will find it possible to send a reassuring communication on the subject to the land owners.

From all that is at hand to-day, the most logical conclusion is that it is not contagious; and Professor Rane, moreover, ventures to say that it is highly improbable that the disease will spread. It will not be as bad next year as it is now, he thinks. In the first place, he finds blighted pines in the midst of a pine grove, with a few trees practically killed and the others not at all touched by it. A perfectly fresh seedling may be found side by side with a matured tree that is dying, and *vice versa*, showing that the disease does not spread from one tree to another, and has no preferences based on the age of a pine.

If one tree is more susceptible to an attack than another, it is the naturally dry and unhealthy, consumptive-looking pine, that shows every sign of being underfed; and from this the deduction is drawn that the strong tree withstands and the weak one yields, when exposed to soil and weather conditions that may be productive of the disease. While it is most common on the white pine, it sometimes attacks the pitch pine also, but it is not as common as many persons may have been led to believe. The State Forester, after his investigation, ventured the estimate that the number of affected pines in the State constitute only a fraction of one per cent of the pine stand, but as yet there are no figures available to qualify this estimate. There is enough of it to give rise to apprehension for the pine forest interest, which is one of growing importance in Massachusetts.

State Forester Rane assigned one of his assistants, B. C. Noyes, the other day to go to Winchendon, whence came many inquiries about the disease, to study the condition in that vicinity, and Mr. Noyes makes this report on the subject: "The blight is found on the pines of all ages. Beginning at the tip of the needle, it works downward and gradually spreads over the whole tree. Trees of weak vitality are most liable to be affected. The blight is undoubtedly due to the unusually cold spring,

followed by excessively hot weather and a period of drought. It has been noticed for several years, but much more so at the present time."

Mr. Charles Bosworth of Winchendon says: "I have noticed the blight for six or eight years, and do not think it serious. This year I noticed it first on one or two trees in the grove in front of my house. These trees are now recovered, while others are affected. In three or four weeks' time I think it will be entirely gone."

Mr. White of Winchendon says: "I have noticed the blight for a long time. One old pine has been in nearly this same condition every year for the past ten years. I do not think it is serious."

Mr. W. H. Brown of Winchendon says: "About two years ago we purchased a tract of growing pine of about six or seven acres. The trees, about a foot high, were at the time pretty generally attacked with the blight, and we hesitated in buying it, on that account. We bought it, however, and to-day it is a thrifty growth, only a few pines being attacked."

Mr. J. G. Folsom, tree warden, says: "I first noticed the blight about six years ago. Just above the village there were several trees affected on both sides of the road. I watched it for two years, and did not notice any increase. The timber on one side was then cut off, but now I cannot find any trace on the trees on the opposite side."

One suggestion as to the cause of it is that some insect has attacked the trees; but in the investigation thus far made nothing has been discovered to substantiate that proposition. There is no sign of animal life on the dead needles, nor have the needles been stung before withering.

Early in the season Professor Rane communicated with Dr. G. E. Stone, at the Hatch Experiment Station, and in a reply to one of the State Forester's letters Dr. Stone writes on the subject as follows: "This trouble has been common since the cold winter of three years ago. I had opportunities to investigate it at that time, and the next year it commenced to show very badly on trees in the form of sun scald, and in the winter in the form of fungi. There were half a dozen fungi found on the pine, but in my estimation all of these were merely the result of the weakened condition of the trees, owing to the severe winter. Dr. Hermann von Schenck and others agree with me.

"My diagnosis of the trouble is as follows: During that cold winter an enormous number of trees were injured, both above and below the ground. I have seen acres of trees, like birches, alders, apple, cherry and a whole host of others, injured at the same time. The pine was injured below as well as above the ground, and I have dug up their roots year after year and found the small ones dead. . . . There was quite a large percentage of the small roots which died, and the dry summer was too hard for them; consequently, the trees suffered from sun scald, and as a result of this and the dying of the tips of the leaves fungi came in after-

ward. . . . I have had trees under observation since that winter, and know of a great many which have recovered entirely. I gathered specimens of certain trees for my laboratory which are absolutely recovered. This has occurred in all cases where the tips of the leaves were burned back only slightly, but when the needles were killed outright there was no recovery of course.

"I had a great many opportunities to observe this in trees planted in rows and growing in forests, and there was absolutely no indication of any contagion, showing that the fungus was a purely secondary matter. In the Middlesex Fells I found about a dozen of these trees two years ago, and made a careful examination of them, but they were isolated from one another in all cases.

"I have been in consultation with some of the authorities in Washington in regard to this trouble, since I have had a large number of specimens to examine, and do not think there is any difference in our diagnosis. This trouble is also found in other portions of New England, Connecticut and Vermont, and I believe it has been reported in New Hampshire."

Some spraying for this disease has been done in Massachusetts, though it is not now believed that such treatment is of any great value. The trees may be saved, however, says State Forester Rane, if treated in time with the right kind of fertilizer. In case most of the needles on the tree are destroyed, the tree cannot be saved by any kind of treatment; and the forester's advice to the owners of such tree is that they cut it down before it dies if there is lumber in it worth saving. If it is only slightly touched, it may possibly be revived. Three pounds of nitrate of soda to a good-sized tree, spread over the ground as far as the branches reach, will give it vigor enough to get out of the effects of the disease attack.

This remedy has been practised by H. L. Frost & Co., tree specialists of Boston, with good success for several years.

Equipment.

During the past year the State Forester has found it necessary to have some additional equipment for carrying on his work. The principal additions are: two field hand cameras; one surveyor's level; two hypsometers; two aneroid barometers; two right angle finders; a pedometer; a set of book cases and files; and other smaller field implements and drafting room supplies.

Changes in Assistants.

The State Forester has been very fortunate in having a corps of efficient assistants throughout the year. The only deplorable

fact is that, as is the usual case, as soon as one's assistants demonstrate their value they are sought after.

Mr. J. J. Dearborn, who has been an assistant in demonstrating practical forestry methods over the State, has done his work so well that the Diamond Match Company has engaged him as their forestry expert. Mr. Dearborn's resignation takes effect February 1.

While the State Forester will miss the valuable service of Mr. Dearborn, he nevertheless will be located with headquarters at Athol in this State and continue in a way to serve the State, although through a private enterprise. The success of Mr. Dearborn can be construed in no other way than a compliment to the effective work of this office during the past year.

Mr. B. C. Noyes, who was also connected with the service until recently, has resigned to accept a position with the firm of H. L. Frost & Co. of Boston.

Expenditures and Receipts.

In accordance with section 6 of chapter 409 of the Acts of 1904, as amended by the Acts of 1907, chapter 473, section 2, the following statement is given of the expenditures for the year ending November 30: —

Salaries of assistants,	$3,189 63
Travelling expenses (not included in co-operative funds),	935 60
Instruments,	196 46
Stationery and other office supplies,	293 08
Printing,	875 67
Postage,	283 30
Miscellaneous,	154 55
Nursery,	1,081 96
Total,	$7,010 25

There was realized from the sale of seedlings already referred to $235.50, which amount has been turned over to the Treasurer and Receiver-General.

In accordance with section 5 of the above-named chapter, the following statement is given of the receipts for travelling and subsistence: —

I. For Lectures.

Everett Grange, Everett,	$2 50
West Newbury Grange, West Newbury,	1 87
State Board of Agriculture, Springfield,	4 75
Public Lecture, Sterling,	3 00
Civic Club, Gleasondale,	1 00
Oakham Farmer's Club, Oakham,	3 00
Grange, Petersham,	3 17
Weymouth High School, Weymouth,	1 00
Pomona Grange, Lowell,	2 00
Amesbury Board of Agriculture, Amesbury,	3 86
Pomona Grange, Methuen,	2 30
Hardwick Grange, Hardwick,	3 00
Middlesex North Agricultural Society, Westford,	2 56
Melrose Woman's Club,	3 15
Massachusetts Horticultural Society, Boston,	1 00
Walpole Grange, Walpole,	98
East Sandwich Grange, East Sandwich,	3 00
Middlesex Worcester Pomona Grange, Groton,	2 50
Worcester Horticultural Society, Worcester,	4 50
Field and Forest Club, Dorchester,	96
Whitman Board of Trade, Whitman,	2 95
North Dana Grange, North Dana,	3 92
Natural History Club, Bolton,	1 15
Springfield Botanical Society, Springfield,	6 50
New England Woman's Club, Boston,	1 00
Sloyd Manual Training School, Boston,	50
Newbury Grange, Newbury,	2 15
State Board of Agriculture, Worcester,	4 50

A list of the visits made, the area of woodland involved and the receipts for expenses are as follows: —

II. For Examinations of Woodlands.

Owner of Woodland.	Town.	Area of Woodland (Acres).	Expense.
J. R. Ayer,	Richmond,	100	–[1]
L. L. Baker,	East Templeton,	70	$2 90
N. D. Bill,	Springfield,	400	20 00
Brockton & Plymouth Street Railroad,	Pembroke,	13	1 20
Miss C. Codman,	Dedham,	18	80
F. G. Crane,	Dalton,	1,600–2,000	19 70
M. H. Foskett,	Wilmington,	35	50
A. M. Goldsbury,	Warwick,	50	10 30
Rev. John Graham,	Warwick,	80	–[1]

[1] No expense.

II. For Examinations of Woodlands — Concluded.

Owner of Woodland.	Town.	Area of Woodland (Acres).	Expense.
Fiske & Field,	Weston,	100	$0 50
A. S. Hayes,	Hopkinton,	130	1 30
Mrs. S. L. Hammond,	Carlisle,	52	50
Rev. N. S. Hoagland,	Warwick,	30	–[1]
Dr. R. Hogner,	Mansfield,	66	1 00
Rev. C. L. Hutchins,	Concord,	200–300	74
Graham D. Johnson,	Andover,	10	97
F. B. Knapp,	Duxbury,	30	1 50
Mass. State Hospital for Epileptics,	Palmer,	200–300	3 80
Miss A. McKim,	Warwick,	30	–[1]
Dr. H. W. Nelson,	Marshfield,	108	1 20
Pontoosuc Woolen Company,	Pittsfield,	143	8 70
Rev. F. H. Rudd,	Richmond,	30–40	50
Salem Fraternity,	Rowley,	15	1 20
H. W. Shepard,	Salisbury,	100	–[2]
J. F. Spaulding,	Tewksbury,	25	50
Rev. E. Sturgis,	Andover,	28	1 80
R. B. Symington,	Chiltonville,	3,000	3 20
F. W. Wise,	Wellfleet,	1,200	14 65
Ellis G. Wood,	Sandwich,	100	–[2]
Geo. M. Whipple,	Newburyport,	50	–[2]
Ormstead Bros.,	The Fells,	–	–[2]
Frost & Co.,	Arlington and Malden,	100	–[2]
School for the Feeble-minded,	Waltham,	40	–[2]
Morris Gray,	Cambridge,	10	–[2]
Brockton Water Commission,	Brockton,	30	1 65
Miss Booth,	Springfield,	10	–[1]
Ames estate,	North Easton,	100	–[2]

[1] No expense. [2] Paid by owner.

What the General Court is asked to consider at Present.

I. Exemption from Taxation on Forest Land.

At present we have a law in our statutes (Revised Laws, chapter 12, section 6) that is ineffective, as it requires that 2,000 trees must be set on an acre of land to exempt it from taxation, while as a matter of fact 1,210 trees are all that are at present recommended for such purposes. The species of trees for planting are also too small, and the time for exemption I believe could well be extended to twenty years. In Wisconsin similar planting is exempt for thirty years. This law should be amended and modernized to meet our needs.

II. Forest Reserves.

It is time that some State forest reserve policy should be established in Massachusetts. The national government is doing much in this direction, and various States have State forest reserves. I would not recommend that this State go into an

elaborate system of reserves, but if the State Forester could be allowed an appropriation for purchasing cheap lands, and be permitted to replant them for demonstrative purposes, the object lesson would be valuable, and the State could not help profiting thereby financially. It is even possible that some towns or individuals would be willing to give lands to the State, provided they could be accepted and planted by the State Forester. One such offer was made during the year, and it is believed offers of land at low cost can be easily secured.

III. We must stop Forest Fires.

After traversing the State and studying conditions carefully, I feel that it will take some drastic mandatory laws in order to cope with the situation. Our people have been so indifferent toward forestry and the protection of forest property that we are absolutely wasting thousands upon thousands of dollars, not only for the present but the future, through sheer negligence. Even much of our so-called scrub growth would yield cord wood, if not lumber, were it not for fires which periodically run over these lands.

With the newly appointed forest warden system better results are expected; but why not clothe this officer with the power to arrest without a warrant any person or persons found in the act of unlawfully setting a fire or trespassing on forest property. This right is given the fish and game wardens; why not the forest wardens and their deputies?

We have a law in our statutes at present (Revised Laws, chapter 32, section 24) which reads as follows: —

> In a town which accepts the provisions of this section or has accepted the corresponding provisions of earlier laws, no fire shall be set in the open air between the first day of April and the first day of October, unless by written permission of a forest warden. The forest warden shall cause public notice to be given of the provisions of this section, and shall enforce the same. Whoever violates the provisions of this section shall be punished by a fine of not more than one hundred dollars, to be divided equally between the complainant and the town, or by imprisonment for not more than one month, or by both such fine and imprisonment.

This law, it is believed, should not be left to the discretion of the towns, but should be enacted as a State law.

IV. The Forest Nursery should be enlarged.

If we had one million white pine seedlings at the State nursery to distribute at cost, I believe they would all be purchased and set out in Massachusetts this coming year. As a matter of fact, we shall not begin to be able to supply the demand, and already I have placed orders for spring delivery for two hundred and fifty thousand white pine seedlings for Massachusetts people. These seedlings can be raised for less than one-half our people are compelled to pay at the present time. As State Forester, I am very anxious to get just as many trees set on our waste and unproductive lands as possible; and, while nurserymen are adjusting their business to meet the growing demands for young trees, and are unable to supply them even at present high prices, it is well that we encourage our forestry interests by growing seedlings at cost. Were it not for the import duty, transplants (seedlings once transplanted) could be imported from Europe, and all charges paid, cheaper than we can purchase the seedlings themselves in this country.

It takes at least two years to grow white pine seedlings before they are ready to be set out permanently, and three or four years for transplants; hence, if we enlarge our nursery work now, it will be some time before the plants are ready for distribution.

Besides white pine, there are many other species of forest trees that should be propagated for dissemination.

I would recommend that the nursery work be increased to at least four times its present capacity. While the first cost would seem large, nevertheless, in from two to four years the money would be returned to the State from the sale of seedlings.

V. Increased Appropriation needed.

While the State Forester deplores the necessity for asking for increased appropriations for his work, he nevertheless feels that it is his duty to do so. While, as has already been shown, the money for both increased nursery work and forest reserves will be returned to the State ultimately, nevertheless, such appropriation must be made to begin with. Five thousand dollars could be used to advantage in enlarging the nursery, and for a system of forest reserves for which the first cost would be relatively large, it is recommended that an appropriation be made.

The regular appropriation for running expenses for the past year was at the rate of $10,000 a year. This amount is asked for the present year.

Beginning with the spring town elections, according to the law passed last year, the new town forest warden law goes into effect. In order to establish the work as it should be, and encourage each town to do more thorough and definite work, a State appropriation of $10,000 is recommended. Of this amount, $2,000 is to be used for holding a convention as stated in the law, and the remainder used in paying forest wardens in various towns for actual service rendered in their respective towns in securing data and rendering services when called upon by the State Forester.

This recommendation applies equally to all towns of the State, as, if it were left to the towns themselves, many would very likely be indifferent; therefore, it is believed it becomes a matter for State legislation. All bills of forest wardens for services rendered at the request of the State Forester must be approved by that office; hence there is good assurance that the money will be strictly used for bettering forestry conditions everywhere in the State. The State Forester even hopes for example, to so educate his wardens that they may be on the lookout and report upon such insects as the gypsy moths should they invade new territory.

Only through forethought and system can we expect to accomplish in forestry what all our citizens would like to see.

Summary of Recommendations.

1. That the law relative to the exemption from taxation of lands set to forest trees be amended.

2. That a system of forest reserves for the State be established, and funds for their purchase and maintenance be created.

3. That the State Forester and his authorized employees and the forest wardens and their authorized deputies be given the same power of arresting persons found in the act of unlawfully setting a fire that the fish and game deputies now have.

4. That the law relative to permission to set fires in the open be amended, and made mandatory to the whole State.

5. That the appropriation for the State Forester's office be the same as last year, $10,000, but that an additional $15,000 be

made for the purpose of increasing the State nursery work, holding the convention of forest wardens, and recompensing these men for their assistance in the broader State forestry work as required under direction of the State Forester.

6. That the State Forester's annual report be made a public document.

Respectfully submitted,

F. W. RANE,
State Forester.